**Exhibit A**
**SCOPE OF WORK**

## TASK LIST

| Task # | Task Name |
|---|---|
| 1 | Administration |
| 2 | 2013 IEPR Historical Vehicle Attribute Data Worksheet and Forecast Vehicle Technologies Worksheet |
| 3 | 2013 IEPR Vehicle Attribute Forecast Worksheet and Market Analysis Worksheet |
| 4 | 2013 IEPR Vehicle Attributes Report and Presentation |
| 5 | 2013 IEPR Historical Vehicle Attribute Data Worksheet Update, Vehicle Technologies Worksheet Update, and Market Analysis Worksheet Update |
| 6 | Staff Training |
| 7 | 2015 IEPR Forecast Vehicle Attribute Worksheet |

## ACRONYMS/GLOSSARY

*Specific acronyms and terms used throughout this scope of work are defined as follows:*

| Acronym | Definition |
|---|---|
| CAM | Contract Agreement Manager |
| CAO | Contract Agreement Officer |
| CPR | Critical Project Review |
| DMV | California Department of Motor Vehicles |
| FTD | Fuels and Transportation Division |
| MPG | Miles per Gallon |
| GGE | Gasoline Gallon Equivalents |

## BACKGROUND

The California Energy Commission (Energy Commission) is directed by Public Resources Code Section 25301 to prepare a forecast of transportation fuel demand to assess the need for resource additions, efficiency, and conservation with consideration for all aspects of energy industries and markets essential for the state economy, general welfare, public health and safety, energy diversity, and protection of the environment.

The Energy Commission will use the data and analysis from this contract to provide baseline data and analytical support for implementing state policy goals of reduced petroleum dependence, increased use of alternative and renewable fuels, and reduced emissions of greenhouse gases

## OBJECTIVE OF THE AGREEMENT

The objective of this agreement is to update data available to the Energy Commission for vehicle manufacturer makes and models from 1992 to 2010, as well as forecasted vehicle manufacturer makes and models from 2011 to 2030.

## FORMAT/REPORTING REQUIREMENTS

### Deliverables/Reports

When creating reports, the Contractor shall use and follow, unless otherwise instructed in writing by the Commission Agreement Manager (CAM), the latest version of the Consultant Reports Style Manual published on the Energy Commission's web site:

http://www.energy.ca.gov/contracts/consultant_reports/index.html

Each final deliverable shall be delivered as one original, reproducible, 8 ½" by 11", camera-ready master in black ink. Illustrations and graphs shall be sized to fit an 8 ½" by 11" page and readable if printed in black and white.

### Electronic File Format

The Contractor shall deliver an electronic copy (CD ROM or memory stick or as otherwise specified by the CAM) of the full text in a compatible version of Microsoft Word (.doc).

The following describes the accepted formats of electronic data and documents provided to the Energy Commission as contract deliverables and establishes the computer platforms, operating systems and software versions that will be required to review and approve all software deliverables.

- Data sets shall be in Microsoft (MS) Access or MS Excel file format.
- PC-based text documents shall be in MS Word file format.
- Documents intended for public distribution shall be in PDF file format, with the native file format provided as well.
- Project management documents shall be in MS Project file format.

### Software Application Development

If this scope of work includes any software application development, including but not limited to databases, websites, models, or modeling tools, contractor shall utilize the following standard Application Architecture components in compatible versions:

- Microsoft ASP.NET framework (version 3.5 and up) Recommend 4.0
- Microsoft Internet Information Services (IIS), (version 6 and up) Recommend 7.5
- Visual Studio.NET (version 2008 and up) Recommend 2010
- C# Programming Language with Presentation (UI), Business Object and Data Layers
- SQL (Structured Query Language)
- Microsoft SQL Server 2008, Stored Procedures Recommend 2008 R2
- Microsoft SQL Reporting Services Recommend 2008 R2
- XML (external interfaces)

Any exceptions to the Software Application Development requirements above must be approved in writing by the Energy Commission Information Technology Services Branch.

## TASK 1- AGREEMENT MANAGEMENT

### Task 1.1 Kick-off Meeting

The goal of this task is to establish the lines of communication and procedures for implementing this Agreement.

**The Contractor shall:**

- Attend a "kick-off" meeting with the CAM, and the Commission Agreements Officer (CAO). The meeting will be held in Sacramento, CA and the CAM will designate the specific location. The Contractor shall include their Project Manager, Contracts Administrator, Accounting Officer, and others designated by the CAM in this meeting. The administrative and technical aspects of this Agreement will be discussed at the meeting.

- If necessary, prepare an updated Schedule of Deliverables based on the decisions made in the kick-off meeting.

**The CAM shall:**

- Arrange the meeting including scheduling the date and time.

- Provide an agenda to all potential meeting participants prior to the kick-off meeting.

**Deliverables:**

- An Updated Schedule of Deliverables (if applicable)

### Task 1.2 Invoices

**The Contractor shall:**

- Prepare invoices for all reimbursable expenses incurred performing work under this Agreement in compliance with the Exhibit B of the Terms and Conditions of the Agreement. Invoices shall be submitted with the same frequency as progress reports (task 1.4). Invoices must be submitted to the Energy Commission's Accounting Office.

**Deliverables:**

- Invoices

### Task 1.3 Manage Subcontractors

The goal of this task is to ensure quality products, to enforce subcontractor Agreement provisions, and in the event of failure of the subcontractor to satisfactorily perform services, recommend solution to resolve the problem.

**The Contractor shall:**

- Manage and coordinate subcontractor activities. The Contractor is responsible for the quality of all subcontractor work and the Energy Commission will assign all work to the Contractor. If the Contractor decides to add new subcontractors, they shall 1) comply with the Terms and Conditions of the Agreement, and 2) notify the CAM who will follow the Energy Commission's process for adding or replacing subcontractors.

### Task 1.4 Monthly Progress Reports

The goal of this task is to periodically verify that satisfactory and continued progress is made towards achieving the objectives of this Agreement on time and within budget.

**The Contractor shall:**

- Prepare progress reports which summarize all Agreement activities conducted by the Contractor for the reporting period, including an assessment of the ability to complete the Agreement within the current budget and any anticipated cost overruns. Each progress report is due within 15 calendar days after the end of the reporting period. The CAM will provide the format for the progress reports.

**Deliverables**:

- Monthly Progress Reports

**Task 1.5 Final Report**

The goal of this task is to prepare a comprehensive written Final Report that describes the original purpose, approach, results and conclusions of the work completed under this Agreement. The Final Report shall be prepared in language easily understood by the public or layperson with a limited technical background.

The Final Report must be completed before the termination date of the Agreement in accordance with the Schedule of Deliverables.

The Final Report shall be a public document. If the Contractor has obtained confidential status from the Energy Commission and will be preparing both a public and a confidential version of the Final Report, the Contractor shall perform the following subtasks for both the public and confidential versions of the Final Report.

**Task 1.5.1 Final Report Outline**

**The Contractor shall:**

- Prepare and submit a draft outline of the Final Report for review and approval. The CAM will provide written comments to the Contractor on the draft outline. The Contractor shall review the comments and discuss any issues with the recommended changes with the CAM.

- Prepare and submit the final outline of the Final Report, incorporating CAM comments.

**Deliverables:**

- Draft Outline of the Final Report
- Final Outline of the Final Report

**Task 1.5.2 Final Report**

**The Contractor shall:**

- Prepare the draft Final Report for this Agreement in accordance with the approved outline.
- Submit the draft Final Report for review and comment. The CAM will provide written comments to the Contractor. The Contractor shall review the comments and discuss any issues with the recommended changes with the CAM.

- Prepare and submit the Final Report, incorporating CAM comments.

**Deliverables**:

- Draft Final Report
- Final Report

**Task 1.6 Final Meeting**
The goal of this task is to discuss closeout of this Agreement and review the project.

**The Contractor shall:**
- Meet with Energy Commission staff prior to the term end date of this Agreement. The meeting will be held in Sacramento, CA and the CAM will designate the specific location. This meeting will be attended by the Contractor Project Manager and the CAM. The CAM will determine any additional appropriate meeting participants. The administrative and technical aspects of Agreement closeout will be discussed at the meeting.

- Present findings, conclusions, and recommended next steps (if any) for the Agreement, based on the information included in the Final Report.

- Prepare a written document of meeting agreements and unresolved activities.

- Prepare a schedule for completing the closeout activities for this Agreement, based on determinations made within the meeting.

**Deliverables:**
- Written documentation of meeting agreements
- Schedule for completing closeout activities

## TECHNICAL TASKS

**Task 2 - 2013 IEPR Historical and Forecast Vehicle Class Data Worksheet**
The goal of this task is for the Contractor to provide historical vehicle attribute data and anticipated future vehicle technology data in order to document the process of the vehicle attributes forecasts.

**Task 2.1 - 2013 IEPR Historical Vehicle Data Worksheet**
The goal of this task is to provide historical vehicle attribute data to be used for policy analysis, vehicle attribute forecasts, and validation of other vehicle attribute forecasts.

**The Contractor shall:**
- For the light, medium, and heavy duty classes referenced in Appendix A, use the information obtained from vehicle manufacturer research and other sources of research to perform a baseline evaluation from 1992 to 2011 of each of the following technologies or fuel types:
    - Gasoline
    - Gasoline Electric Hybrids
    - Diesel
    - Diesel Electric Hybrid
    - Propane
    - Flexible Fuel Vehicles (FFV)
    - Plug-in Electric Gasoline Hybrids
    - Compressed Natural Gas (CNG)
    - Liquefied Natural Gas (LNG)
    - Dual Fuel – Gasoline and CNG
    - Full Electric
    - Hydrogen Vehicles

- Develop a historical baseline of vehicle technology attributes by make and model from 1992 to 2011 for gasoline, diesel, gasoline electric hybrid, plug-in gasoline electric hybrid, full electric, propane, compressed natural gas, liquefied natural gas, and hybrid classes.
- In addition to providing historical vehicle attribute data by make and model, provide vehicle attribute data aggregated by vehicle class.
- Include the following light duty historical vehicle attributes:
    - Model year of vehicle
    - Vehicle class of vehicle
    - Number of individual makes and models
    - Manufacturer Suggested Retail Price of a new car expressed in 2011 U.S. dollars
    - Fuel economy (on-road miles per gallon (MPG), or gasoline gallon equivalents (GGE))
    - Acceleration (seconds to 60 miles per hour)
    - Annual new car maintenance cost in 2011 dollars, including fees for oil changes and regular maintenance
    - Gradeability (speed vehicle could maintain while climbing a 20-mile mountainous grade with full load)
    - Range (the contractor shall report how range is determined specifying if it is all highway or a combined city/highway range estimate)
    - Expected vehicle lifetime
    - Passenger Seat Capacity (number of passengers)
    - Trunk or Storage Space (in cubic feet)
    - Time needed to complete full fueling or charging

- Include the following medium and heavy duty vehicle attributes:
    - Model year of vehicle
    - Vehicle class of vehicle
    - Body type (a component of vehicle class, e. g., bus type I, II, or III, tractor or straight truck, van, flatbed, tank, cement, garbage)
    - Passenger Seat Capacity (number of passengers)
    - Freight Capacity (in tons)
    - Cargo Capacity (in cubic feet)
    - Fuel economy (on-road MPG, or GGE)
    - Annual fuel consumption in GGE
    - Annual new vehicle maintenance cost in 2011 dollars, including fees for oil changes and regular maintenance
    - Manufacturer Suggested Retail Price in 2011 dollars
    - Range (the contractor shall report how range is determined specifying if it is all highway or a combined city/highway range estimate).
    - Expected vehicle lifetime
    - Gross Vehicle Weight
    - Torque
    - Torque to weight ratio

- Identify and include any additional vehicle or fuel attributes that would enhance the quality of the baseline evaluation and forecast.
- Use fuel economy estimates consistent with the U.S. Environmental Protection Agency's revised methodology
- Explain the methodology used to estimate on-road mpg estimates.

- Provide all details and assumptions regarding fuel economy estimates and duty cycles for vehicles using alternative fuels. For example, plug-in gasoline electric vehicles are able to run on both electricity and gasoline; the vehicle efficiency will depend on what portion of the time the vehicle uses electricity or gasoline.
- Provide details of the percentage of travel time the vehicle is using electricity only and the percentage of travel time the vehicle is using gasoline
- Discuss, for gasoline hybrid, diesel hybrid, and plug-in electric hybrid vehicles, current battery performance metrics i.e., cost/kWh, battery cycle life, battery calendar life, power density, and range deteriorations, affecting range and cost assumptions.
- Meet and/or correspond with Energy Commission staff and/or other contractors as necessary in order to ensure consistent vehicle class definitions, and to reconcile model/vintage year in order to ensure consistent vehicle populations and classifications.
- Adhere to the medium and heavy duty vehicle class definitions provided by the CAM.
- Incorporate a 10 percent ethanol blend for all gasoline vehicles and take the lower energy content of fuel into consideration when estimating on-road fuel economies.
- Use the vehicle class definitions provided by the Energy Commission. This guide file will be used for allocating vehicles to the appropriate vehicle class in the California Department of Motor Vehicles' (DMV) Vehicle Registration Database.
- Develop a 2013 IEPR Historical Vehicle Data Worksheet of the historical baseline from 1992 to 2011 in Microsoft Excel. The worksheet shall contain four sections:
    - Section 1: Historical Vehicle Class baseline from 1992 to 2011 aggregated by vehicle class
    - Section 2: Historical Vehicle Class baseline data disaggregated by vehicle make, year, and model
    - Section 3: Details and assumptions regarding fuel economy estimates and for alternative fuels
    - Section 4: Details and assumptions explaining how disaggregated vehicle data is combined into vehicle classes
- Submit the Draft 2013 IEPR Historical Vehicle Class Data Worksheet to the CAM for review and comment and incorporate all feedback and comments in the Final 2013 IEPR Historical Vehicle Data Worksheet.
- Format all data to expedite data entry

**The CAM shall:**

- Provide the Contractor with DMV Guide File for vehicle class definitions in order to ensure the development of light duty vehicle characteristics that are consistent with other Energy Commission analyses. Vehicle classes by make and model shall follow guidelines set forth in the guide file and all documents provided to the Contractor. These guidelines are used by multiple sources; hence consistency in all baseline and forecast data is critical.
- Provide a Microsoft Excel data template within one week after the Kickoff Meeting.

**Deliverables:**

- Draft 2013 IEPR Historical Vehicle Data Worksheet
- Final 2013 IEPR Historical Vehicle Data Worksheet

**Task 2.2 - 2013 IEPR Forecast Vehicle Technologies Worksheet**

The goal of this task is to improve the reliability and defensibility of vehicle attribute forecasts by documenting recent technological changes and anticipated future technologies to be incorporated in the forecasts.

**The Contractor shall:**

- Provide the Energy Commission with a Draft Vehicle Technologies Worksheet containing an updated list of vehicle technologies and a description of the attributes of these vehicle technologies.
- Specify all technology updates that will be incorporated into vehicle attribute forecasts.
- Incorporate recent vehicle and component technological advances, changes to California-specific market conditions, economy of scale manufacturing achievements, vehicle deployment market penetration, changes in applicable state or federal laws, regulations, and incentives, and the most current DMV and vehicle manufacturer data
- Maintain consistency with recent California regulations
- Include the different vehicle technologies that meet California's unique emission requirements
- Include vehicle technology updates for each of the following fuel types:
  - Gasoline
  - Gasoline Electric Hybrids
  - Diesel (fueled by Diesel)
  - Diesel (fueled by Biodiesel)
  - Diesel Electric Hybrid
  - Propane
  - Plug-in Electric Gasoline Hybrids
  - Flexible Fuel (fueled solely by E85, a blend of 85% ethanol and 15% gasoline)
  - Flexible Fuel (fueled solely by gasoline)
  - Compressed Natural Gas (CNG)
  - Liquefied Natural Gas (LNG)
  - Dual fuel vehicles (fueled by gasoline and CNG)
  - Full Electric
  - Hydrogen Vehicles
- Submit a Draft Vehicle Technologies Worksheet to the CAM in Microsoft Excel format for review and comment and incorporate all feedback and comments in the Final Vehicle Technologies Worksheet

**Deliverables:**

- 2013 IEPR Draft Forecast Vehicle Technologies Worksheet
- 2013 IEPR Final Forecast Vehicle Technologies Worksheet

## Task 3 - 2013 IEPR Vehicle Attribute Forecast Worksheet and Market Analysis Worksheet

The goal of this task is for the Contractor to provide vehicle attributes forecasts to be used as inputs in the transportation demand models used by the Energy Commission and linked by the Energy Commission's DynaSim software and to provide market analysis related to future vehicle attributes forecasts. Additionally, the forecasts will support analysis required to implement state policy goals to reduce petroleum dependence, increase use of alternative and renewable fuels, and reduce emissions of greenhouse gases.

### Task 3.1 - 2013 IEPR Forecast Vehicle Attribute Worksheet

The goal of this task is to provide vehicle attributes forecasts to be used as inputs in the transportation demand models used by the Energy Commission and linked by the DynaSim software.

**The Contractor shall:**

- Provide the most reliable forecast of vehicle attribute data for up to sixteen price, policy, and economic cases provided to the Contractor for the years 2013 to 2035, including thorough documentation of all inputs and assumptions.
- Project the number of models by class with special attention to the plans of manufacturers for alternative fuel vehicles.
- Complete all scenarios and cases and describe circumstances, conditions, and assumptions required for each scenario and case.
- Provide a Microsoft Excel worksheet that includes, but is not limited to:
    - All vehicle attribute data for all scenarios
    - Forecasts of models by vehicle class.
- Estimate growth rates for future makes and models for each vehicle class evaluated.
- Document the methodology used in obtaining these growth rates.
- Validate the forecast by forecasting vehicle attributes from an earlier base year and comparing forecast results to actual data, noting and explaining any discrepancies between forecast and actual data.
- Include the following five sections in the Draft Vehicle Attribute Worksheet:
    - Section 1: Vehicle Class Attribute Data Forecast from 2013 to 2035 aggregated by vehicle class
    - Section 2: Details and assumptions regarding fuel economy estimates and duty cycles for all alternative fuels. This section shall specify how data by vehicle make, model, and year is aggregated into data by vehicle class
    - Section 3: Details and assumptions explaining how disaggregated vehicle data is combined into vehicle classes
    - Section 4: Fuel economy forecasts for flexible fuel vehicles (FFVs) assuming they are fueled solely by gasoline
    - Section 5: Fuel economy forecasts for flex-fuel vehicles assuming they are fueled by E85
- Compare results with forecasts produced by other offices and contractors as directed by the CAM and account for any discrepancies
- Format data to expedite data entry using the template provided by the CAM
- Submit a Draft Vehicle Attribute Worksheet to the CAM for review and comment and incorporate all feedback and comments into the Final Vehicle Attribute Worksheet.
- Incorporate all feedback and comments in the Final Vehicle Class Forecast Data worksheet

**The CAM shall:**

- Provide the Contractor with all price, policy, and economic cases
- Coordinate with other offices and contractors as needed to facilitate forecast comparison

**Deliverables:**

- 2013 IEPR Draft Forecast Vehicle Attribute Worksheet including documentation of all inputs and assumptions
- 2013 IEPR Final Forecast Vehicle Attribute Worksheet including documentation of all inputs and assumptions

**Task 3.2 - 2013 IEPR Market Analysis and Vehicle Technology Data Survey**
The goal of this task is to update information on future vehicle technology and assist Energy Commission staff in comparing the costs and benefits of different types of vehicle technology. These comparisons will be used in the IEPR reports and for policy analysis.

**The Contractor Shall:**
- Obtain the following information by surveying vehicle manufacturers or using equivalent methods:
  - Plans to incorporate current and new vehicle technologies for the years 2012 to 2035
  - Anticipated vehicle classes and models that manufacturers will sell for the years 2012 to 2035 for light, medium, and heavy duty vehicles
- For each type of technology, compare the marginal cost of alternative fuel vehicle technology (relative to conventional fuel technology) to savings achieved via reduced gasoline and diesel consumption
- Compare the marginal cost of technology to improve fuel economy in gasoline vehicles to savings achieved via reduced fuel consumption
- Compare the total lifetime vehicle and operating cost to the consumer or fleet user for each type of technology. Gasoline, diesel, and alternative fuel prices shall be taken into account in these comparisons
- Report research results to the Energy Commission in a Draft Market Analysis Worksheet, which shall describe the survey methodology, results, recommendations, data sources, and data. All information shall be provided in Microsoft Word or Microsoft Excel format. The projection data spreadsheets shall be formatted to meet DynaSim format needs.
- Submit the Draft Market Analysis Worksheet to the Energy Commission for review and comment and incorporate all comments and feedback in the Final Market Analysis Worksheet.

**Deliverables:**
- 2013 IEPR Draft Market Analysis Worksheet
- 2013 IEPR Final Market Analysis Worksheet

**<u>Task 4 - 2013 IEPR Vehicle Attributes Report and Presentation</u>**

The goal of this task is to publicly document, analyze, and explain all assumptions and methodology used in the vehicle attributes forecasts while providing opportunity for stakeholders and the general public to provide input.

**Task 4.1 - 2013 IEPR Vehicle Attributes Report**
The goal of this task is to document, analyze, and explain all assumptions and methodology used in tasks 2 and 3.

**The Contractor shall:**
- Include the projected cost and fuel economy, improvement of technologies and an overview of expected availability and market penetration schedules of hybrid, plug-in hybrid, flex-fuel, diesel, diesel electric hybrid, CNG, LNG, full electric, propane, and hydrogen vehicles
- Document how vehicle attribute data is aggregated from the make, model, and year level to the vehicle class level
- Discuss the cost, payback period, and total lifetime cost to the consumer or fleet user of fuel efficiency improvements and alternative fuel vehicle adoption

- Identify deployment trends and barriers impacting the adoption of alternative fuel market penetration.
- Prepare the report in language easily understood by the public or by a layperson with a limited technical background
- Document and explain all assumptions and data sources used to complete the survey and forecasts
- Follow the Energy Commission report format as specified by the CAM
-

**Deliverables:**

- Draft 2013 IEPR Vehicle Attributes Report including documentation of all assumptions and data sources
- Final 2013 IEPR Vehicle Attributes Report including documentation of all assumptions and data sources

**Task 4.2 - 2013 IEPR Presentation**

The goal of this task is to provide an opportunity for stakeholders and members of the public to directly inquire about the methodology, analysis, and results on Tasks 2 and 3 and their impact on the 2013 IEPR.

**The Contractor shall:**

- Prepare a presentation that includes the following information as they relate to tasks 2 though 6:
  - Explanation of forecast results
  - Explanation of cost, payback period, and total lifetime cost to the consumer or fleet user of fuel efficiency improvements and alternative fuel vehicle adoption
  - Explanation of data sources used to obtain historical and forecast data
  - Explanation of vehicle attribute forecast validation methodology
  - Explanation of vehicle technology adoption assumptions used in forecasts
- Submit the Draft 2013 IEPR presentation slides to the CAM for review and comment. The Contractor shall incorporate all feedback and comments in the Final 2013 IEPR presentation slides.
- Attend and present at one 2013 IEPR hearing, in late spring or summer 2013, under the direction of the CAM
- Respond to questions presented by Energy Commission staff, commissioners, stakeholders, and members of the general public
- Prepare a summary of the IEPR presentation, including responses to any questions that could not be addressed during the presentation

**Deliverables:**

- Draft 2013 IEPR presentation slides
- Final 2013 IEPR presentation slides
- Summary of 2013 IEPR presentation

**Task 5 - 2015 IEPR Historical Vehicle Attribute Data Worksheet Update, Vehicle Technologies Worksheet Update, and Market Analysis Worksheet Update**

The goal of this task is to provide historical vehicle attribute data, anticipated future vehicle technology data, and market analysis in order to document the process of the vehicle attributes forecasts.

**Task 5.1 - 2015 IEPR Historical Vehicle Attribute Data Worksheet Update**
The goal of this task is to provide updated vehicle attribute data for the years 2012 and 2013 to be used in the 2015 IEPR and to validate Task 4 forecasts.

**The Contractor shall:**

- Develop a historical baseline of vehicle technology attributes by make and model from 1992 to 2013 for all fuel types and vehicle attributes included in Task 2
- In addition to providing historical vehicle attribute data by make and model, provide vehicle attribute data aggregated by vehicle class for all fuel types and vehicle attributes included in Task 2
- Identify and include any additional vehicle or fuel attributes that would enhance the quality of the baseline evaluation and forecast
- Use fuel economy estimates consistent with the U.S. Environmental Protection Agency's revised methodology, including any updates that occur over the term of the contract
- Explain the methodology used to estimate on-road mpg estimates
- Provide all details and assumptions regarding fuel economy estimates and duty cycles for vehicles using alternative fuels. For example, plug-in gasoline electric vehicles are able to run on both electricity and gasoline; the vehicle efficiency will depend on what portion of the time the vehicle uses electricity or gasoline
- Provide details of the percentage of travel time the vehicle is using electricity only and the percentage of travel time the vehicle is using gasoline
- Discuss, for gasoline hybrid, diesel hybrid, and plug-in electric hybrid vehicles, current battery performance metrics i.e., cost/kWh, battery cycle life, battery calendar life, power density, and range deteriorations, affecting range and cost assumptions
- Meet and/or correspond with Energy Commission staff and/or other contractors as necessary in order to ensure consistent vehicle class definitions, and to reconcile model/vintage year in order to ensure consistent vehicle populations and classifications
- Adhere to the medium and heavy duty vehicle class definitions provided by the CAM
- Incorporate a 10 percent ethanol blend for all gasoline vehicles and take the lower energy content of fuel into consideration when estimating on-road fuel economies
- Use the vehicle class definitions provided by the California Energy Commission. This guide file will be used for allocating vehicles to the appropriate vehicle class in the DMV Vehicle Registration Database
- Develop a 2015 IEPR Historical Vehicle Data Worksheet of the historical baseline from 1992 to 2013 in Microsoft Excel. The worksheet shall contain four sections:
    - Section 1: Historical Vehicle Class baseline from 1992 to 2013 aggregated by vehicle class
    - Section 2: Historical Vehicle Class baseline data disaggregated by vehicle make, year, and model
    - Section 3: Details and assumptions regarding fuel economy estimates and for alternative fuels
    - Section 4: Details and assumptions explaining how disaggregated vehicle data is combined into vehicle classes
- Submit the Draft 2015 IEPR Historical Vehicle Class Data Worksheet to the CAM for review and comment and incorporate all feedback and comments in the Final 2015 IEPR Historical Vehicle Data Worksheet
- Format all data to expedite data entry

**The CAM shall:**

- Provide the Contractor with DMV Guide File vehicle class definitions in order to ensure the development of light duty vehicle characteristics that are consistent with other Energy Commission analyses. Vehicle classes by make and model shall follow guidelines set forth in the guide file and all documents provided to the Contractor. These guidelines are used by multiple sources; hence consistency in all baseline and forecast data is critical.
- Provide a Microsoft Excel data template within one week after the Kickoff Meeting.

**Deliverables:**

- Draft 2015 IEPR Historical Vehicle Data Worksheet
- Final 2015 IEPR Historical Vehicle Data Worksheet

**Task 5.2 - 2015 IEPR Vehicle Technologies Worksheet Update**

The goal of this task is to improve the reliability and defensibility of 2015 IER vehicle attribute forecasts by documenting recent technological changes and anticipated future technologies to be incorporated in the forecasts, including technological plans and changes initiated over the term of the contract.

**The Contractor shall:**

- Provide the Energy Commission with a Draft Vehicle Technologies Worksheet containing an updated list of vehicle technologies and a description of the attributes of these vehicle technologies
- Specify all technology updates that will be incorporated into vehicle attribute forecasts
- Incorporate recent vehicle and component technological advances, changes to California-specific market conditions, economy of scale manufacturing achievements, vehicle deployment market penetration, changes in applicable state or federal laws, regulations, and incentives, and the most current California DMV and vehicle manufacturer data
- Maintain consistency with recent California regulations
- Include the different vehicle technologies that meet California's unique emission requirements
- Explain changes in vehicle technologies that have occurred since the 2013 IEPR vehicle technologies worksheet
- Include vehicle technology updates for all fuel types specified in Task 3
- Submit a Draft Vehicle Technologies Worksheet to the CAM in Microsoft Excel format for review and comment and incorporate all feedback and comments in the Final Vehicle Technologies Worksheet

**The CAM shall:**

- Provide a Microsoft Excel data template within one week after the Kickoff Meeting

**Deliverables:**

- 2015 IEPR Draft Forecast Vehicle Technologies Worksheet including documentation of all inputs and assumptions
- 2015 IEPR Final Forecast Vehicle Technologies Worksheet including documentation of all inputs and assumptions

**Task 5.3 - 2015 IEPR Market Analysis and Vehicle Technology Data Survey**
The goal of this task is to update information on future vehicle technology and assist Energy Commission) staff in comparing the costs and benefits of different types of vehicle technology. These comparisons will be used in the IEPR reports and for policy analysis.

**The Contractor Shall:**
- Obtain the following information by surveying vehicle manufacturers or using equivalent methods:
  - Plans to incorporate current and new vehicle technologies from 2014 to 2035
  - Anticipated vehicle classes and models that manufacturers will sell from 2014 to 2035 for light, medium, and heavy duty vehicles
- For each type of technology, compare the marginal cost of alternative fuel vehicle technology (relative to conventional fuel technology) to savings achieved via reduced gasoline and diesel consumption
- Compare the marginal cost of technology to improve fuel economy in gasoline vehicles to savings achieved via reduced fuel consumption
- Compare the total lifetime vehicle and operating cost to the consumer or fleet user for each type of technology. Gasoline, diesel, and alternative fuel prices shall be taken into account in these comparisons
- Report research results to the Energy Commission in a Draft Market Analysis Worksheet, which shall describe the survey methodology, results, recommendations, data sources, and data. All information shall be provided in Microsoft Word or Microsoft Excel format. The projection data spreadsheets shall be formatted to meet DynaSim format needs
- Submit the Draft Market Analysis Worksheet to the Energy Commission for review and comment and incorporate all comments and feedback in the Final Market Analysis Worksheet

**Deliverables:**
- 2015 IEPR Draft Market Analysis Worksheet
- 2015 IEPR Final Market Analysis Worksheet

**<u>Task 6 – Staff Training</u>**
The goals of this task are (1) with respect to the 2015 IEPR, educate and train Energy Commission staff to accurately describe and document the contractor's 2015 IEPR vehicle attribute forecast results in public documents and forums; (2) with respect to the 2017 IEPR and beyond, educate and train Energy Commission staff on Contractor's data documentation and model documentation methods and process to enable Energy Commission staff to independently produce their own vehicle attribute forecasts for the 2017 IEPR and beyond. This education and training shall be sufficient to allow Energy Commission staff to explain and summarize the vehicle attribute forecast results to the public and any interested parties and, if necessary, defend the contractor's 2015 vehicle attribute forecast results in any forum or document including but not limited to the IEPR.

**Task 6.1 – Model Background**
The goal of this task is to familiarize Energy Commission staff with the model used by the Contractor. This shall serve both to enable staff to defend forecast results and to train staff in the process of producing vehicle supply forecasts.

**The Contractor shall:**
- Provide all input data sources and data to the CAM, under a mutually-acceptable confidentiality agreement if necessary.

- Document and explain how the input data sources were obtained.
- Provide full documentation of the vehicle attribute modeling methodology and equations used to the CAM, under a mutually-acceptable confidentiality agreement if needed.

**Deliverables:**
- Input Data Sources and Data
- Vehicle Attribute Modeling Methodology and Equations

**Task 6.2 – Staff Forecast Training**
The goal of this task is to train staff to independently produce vehicle attribute forecasts in the 2017 IEPR and beyond.

**The Contractor shall:**
- Develop a training plan that includes:
    - Training on Contractor's process, methods and model for producing vehicle attribute forecasts
    - Thorough instruction and training to Energy Commission staff in Contractor's process, methods and model for producing vehicle attribute forecasts for the 2015 IEPR under the direction of the CAM
    - Opportunities for Energy Commission staff to create forecasts with the assistance and supervision of the Contractor
    - Assistance to Energy Commission staff in documenting the methodology used in vehicle attribute forecasts
    - Assistance to Energy Commission staff in planning and implementing the transition to independently producing forecasts without the Contractor's assistance or modeling program for the 2017 IEPR and beyond

**Deliverables:**
- Draft Training Plan
- Final Training Plan

**Task 7 - 2015 IEPR Vehicle Attribute Forecast Worksheet, Presentation, and Vehicle Attributes Report**
The goal of this task is to provide, document, and explain the vehicle attribute forecasts. The forecasts will support analysis required to implement state policy goals to reduce petroleum dependence, increase use of alternative and renewable fuels, and reduce emissions of greenhouse gases.

**Task 7.1 - 2015 IEPR Forecast Vehicle Attribute Worksheet**
The goal of this task is to provide vehicle attributes forecasts to be used as inputs in the transportation demand models used by the Energy Commission and linked by the DynaSim software and used in the 2015 IEPR.

**The Contractor shall:**

- Provide vehicle attribute data for up to sixteen additional price, policy, and economic cases provided to the Contractor for the years 2015 to 2035 to facilitate their use in the model, not necessarily including any cases used in Task 4
- Project the number of models by class with special attention to the plans of manufacturers for alternative fuel vehicles
- Complete all scenarios and cases and describe circumstances, conditions, and assumptions required for each scenario and case
- Provide a Microsoft Excel worksheet that includes, but is not limited to:
    - All vehicle attribute data for all scenarios
    - Forecasts of models by vehicle class.
- Estimate growth rates for future makes and models for each vehicle class evaluated
- Document the methodology used in obtaining these growth rates
- Validate the forecast by forecasting vehicle attributes used in the 2013 IEPR and comparing forecast results to actual data, noting and explaining any discrepancies between forecast and actual data.
- Include the following five sections in the Draft Vehicle Attribute Worksheet:
    - Section 1: Vehicle Class Attribute Data Forecast for the years 2015 to 2035 aggregated by vehicle class
    - Section 2: Details and assumptions regarding fuel economy estimates and duty cycles for all alternative fuels. This section shall specify how data by vehicle make, model, and year is aggregated into data by vehicle class
    - Section 3: Details and assumptions explaining how disaggregated vehicle data is combined into vehicle classes
    - Section 4: Fuel economy forecasts for flexible fuel vehicles (FFVs) assuming they are fueled solely by gasoline
    - Section 5: Fuel economy forecasts for flex-fuel vehicles assuming they are fueled by E85
- Compare results with forecasts produced by other offices and contractors as directed by the CAM and account for any discrepancies
- Format data to expedite data entry using the template provided by the CAM
- Submit a 2015 IEPR Draft Vehicle Attribute Worksheet to the CAM for review and comment and incorporate all feedback and comments into the Final Vehicle Attribute Worksheet.
- Incorporate all feedback and comments in the 2015 IEPR Final Vehicle Class Forecast Data worksheet

**The CAM shall:**

- Provide the Contractor with all price, policy, and economic cases
- Coordinate with other offices and contractors as needed to facilitate forecast comparison

**Deliverables:**

- 2015 IEPR Draft Forecast Vehicle Attribute Worksheet including documentation of all inputs and assumptions
- 2015 IEPR Final Forecast Vehicle Attribute Worksheet including documentation of all inputs and assumptions

**Task 7.2 - 2015 IEPR Presentation**

The goal of this task is for the Contractor to assist Energy Commission staff in providing an opportunity for stakeholders and members of the public to directly inquire on the methodology, analysis, and results on Tasks 8, 9, 10, and 12 and their impact on the 2015 IEPR.

**The Contractor shall:**

- Prepare a presentation that includes the following information as they relate to tasks 2 though 6:
  - Explanation of forecast results
  - Explanation of cost, payback period, and total lifetime cost to the consumer or fleet user of fuel efficiency improvements and alternative fuel vehicle adoption
  - Explanation of data sources used to obtain historical and forecast data
  - Explanation of vehicle attribute forecast validation methodology
  - Explanation of vehicle technology adoption assumptions used in forecasts
- Submit the Draft 2015 IEPR presentation slides to the CAM for review and comment. The Contractor shall incorporate all feedback and comments in the Final 2015 IEPR presentation slides
- Attend and present at one 2015 IEPR hearing, in fall 2015, under the direction of the CAM
- Respond to questions presented by Energy Commission staff, commissioners, stakeholders, and members of the general public
- Prepare a summary of the 2015 IEPR presentation, including responses to any questions that could not be addressed during the presentation

**Deliverables:**

- Draft 2015 IEPR presentation slides
- Final 2015 IEPR presentation slides
- Summary of 2015 IEPR presentation

**Task 7.3 - 2015 IEPR Vehicle Attributes Report**

The goal of this task is for the Contractor to document and analyze all assumptions and methodology used in tasks 2 through 13. Additionally, this task will serve to explain and defend the results of tasks 2, 3, 8, and 12.

**The Contractor shall:**

- Include the projected cost and fuel economy, improvement of technologies and an updated overview of expected availability and market penetration schedules of hybrid, plug-in hybrid, flex-fuel, diesel, diesel electric hybrid, CNG, LNG, full electric, propane, and hydrogen vehicles
- Document how vehicle attribute data is aggregated from the make, model, and year level to the vehicle class level
- Update and discuss the cost, payback period, and total lifetime cost to the consumer or fleet user of fuel efficiency improvements and alternative fuel vehicle adoption
- Update and identify deployment trends and barriers impacting the adoption of alternative fuel market penetration
- Compare the 2013 and 2015 IEPR vehicle attribute forecasts, discussing the reasons for any differences in forecast data
- Prepare the report in language easily understood by the public or by a layperson with a limited technical background
- Document and explain all assumptions and data sources used to complete the survey and forecasts

- Follow the Energy Commission report format as specified by the CAM

**The CAM shall:**

- Provide the Energy Commission report format

**Deliverables:**

- Draft 2015 IEPR Vehicle Attributes Report
- Final 2015 IEPR Vehicle Attributes Report

## SCHEDULE OF DELIVERABLES AND DUE DATES

| Task Number | Deliverable | Due Date |
|---|---|---|
| **1** | | |
| 1.1 | An Updated Schedule of Deliverables | If applicable |
| 1.2 | Invoices | With progress report |
| 1.4 | Monthly Progress Reports | Monthly |
| 1.5 | Draft Final Report<br>Final Report | January 15, 2016<br>January 31, 2016 |
| 1.6 | Written documentation of meeting agreements<br>Schedule for completing closeout activities | February 15, 2016<br>February 28, 2016 |
| **2** | | |
| 2.1 | 2013 IEPR Draft Historical Vehicle Data Worksheet<br>2013 IEPR Final Historical Vehicle Data Worksheet | March 22, 2013<br>March 29, 2013 |
| 2.2 | 2013 IEPR Draft Forecast Vehicle Technologies Worksheet<br>2013 IEPR 2013 IEPR Final Forecast Vehicle Technologies Worksheet | April 5, 2013<br>April 12, 2013 |
| **3** | | |
| 3.1 | 2013 IEPR Draft Forecast Vehicle Attribute Worksheet<br>2013 IEPR Final Forecast Vehicle Attribute Worksheet | April 19, 2013<br>April 30, 2013 |
| 3.2 | 2013 IEPR Draft Market Analysis Worksheet<br>2013 IEPR Final Market Analysis Worksheet | May 17, 2013<br>May 28, 2013 |
| **4** | | |
| 4.1 | Draft 2013 IEPR Vehicle Attributes Report<br>Final 2013 IEPR Vehicle Attributes Report | July, 2013<br>November, 2014 |

| | | |
|---|---|---|
| 4.2 | Draft 2013 IEPR presentation slides<br>Final 2013 IEPR presentation slides<br>Summary of 2013 IEPR presentation | July, 2013<br>August, 2013<br>August 2013 |
| **5** | | |
| 5.1 | Draft 2015 IEPR Historical Vehicle Data Worksheet<br>Final 2015 IEPR Historical Vehicle Data Worksheet | November 7, 2014<br>November 14, 2014 |
| 5.2 | 2015 IEPR Draft Forecast Vehicle Technologies Worksheet<br>2015 IEPR 2013 IEPR Final Forecast Vehicle Technologies Worksheet | January 15, 2015<br>January 22, 2015 |
| 5.3 | 2015 IEPR Draft Market Analysis Worksheet<br>2015 IEPR Final Market Analysis Worksheet | December 8, 2014<br>December 15, 2014 |
| **6** | | |
| 6.1 | Input Data Sources and Data<br>Vehicle Attribute Modeling Methodology and Equations | July 15, 2014<br>March 17, 2014 |
| 6.2 | Draft Training Plan<br>Final Training Plan | April 15, 2014<br>May 15, 2014 |
| **7** | | |
| 7.1 | 2015 IEPR Draft Forecast Vehicle Attribute Worksheet<br>2015 IEPR Final Forecast Vehicle Attribute Worksheet | March, 2015<br>March, 2015 |
| 7.2 | Draft 2015 IEPR presentation slides<br>Final 2015 IEPR presentation slides<br>Summary of 2015 IEPR presentation | July, 2015<br>August, 2015<br>August, 2015 |
| 7.3 | Draft 2015 IEPR Vehicle Attributes Report<br>Final 2015 IEPR Vehicle Attributes Report | July, 2015<br>August, 2015 |